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# Northern Gulf of Mexico (NGOM) Regional Sediment Management Demonstration Program Initiatives

*by Larry E. Parson and Susan I. Rees*

**PURPOSE.** This Coastal and Hydraulics Engineering Technical Note (CHETN) describes the project level program initiatives for the Northern Gulf of Mexico (NGOM) Regional Sediment Management (RSM) Demonstration Program (DP), which was led by the US Army Corps of Engineers Mobile District. Mobile's demonstration identified and prioritized projects and associated issues that could quickly realize the benefits resulting from a regional management approach. The experience gained from these initiatives has been extended and applied to other Mobile District projects throughout the region.

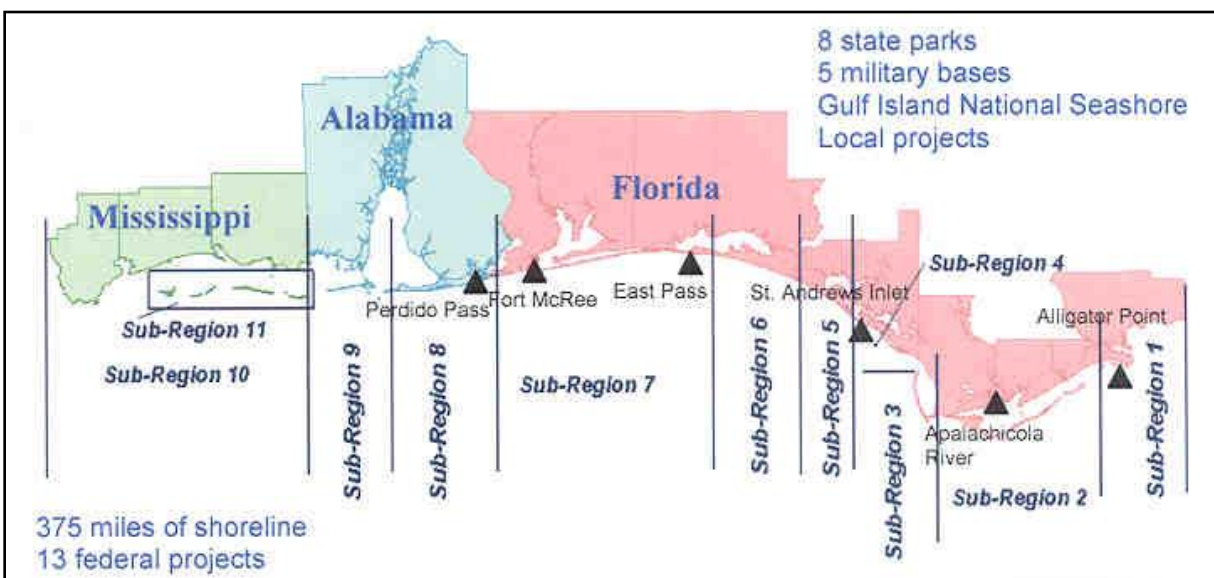
**BACKGROUND.** Coastal projects are dynamic features in terms of littoral processes and play a major role in the variability of and impacts on adjacent shorelines. Coastal projects may be composed of components including navigation channels, structures, shorelines, tidal shoals, harbor areas, and longshore features that are part of a functional system, which together define the behavior of the overall project. Each project is also part of a larger system impacting and contributing to the behavior of an entire region. Regional sediment management is the practice of making local, project-level decisions based on an understanding of local and regional-scale processes. Costly shoreline management decisions are often based on a single project or project component without the knowledge of the behavior of the entire system on both a local and regional scale.

The NGOM Regional Sediment Management Demonstration Program was piloted by the Mobile District with objectives to: (1) implement regional sediment management practices, (2) improve economic performance by linking projects, (3) develop new engineering techniques to optimize/conservate sediment, (4) determine bureaucratic obstacles to regional sediment management, and (5) manage sediment in concert with the environment according to the Environmental Operating Principles of the US Army Corps of Engineers (<http://www.corpsresults.us/environment/envprinciples.htm>). Attaining these objectives was envisioned to improve resource management by exploring beneficial uses of dredged material and maximizing the return of sand into the littoral system, therefore minimizing environmental impacts, and optimizing economic benefits. The Demonstration Program was initiated in 1999 with an initial focus on coastal projects, although the program expanded to include riverine issues in one initiative. Two of the five initiatives identified as part of the Demonstration Program (Perdido Pass and East Pass) were completed within the 4-year pilot study. Implementation of regional sediment management concepts for the other initiatives continues as a part of normal District business practice. The NGOM region consists of 375 miles of shoreline with various Federal, state, local, and military projects (Figure 1).

**PROGRAM INITIATIVES.** There are many projects at various levels throughout the NGOM region, and each has its associated problems and management issues. It must be realized that not all of the projects and issues can be dealt with simultaneously and that regional sediment

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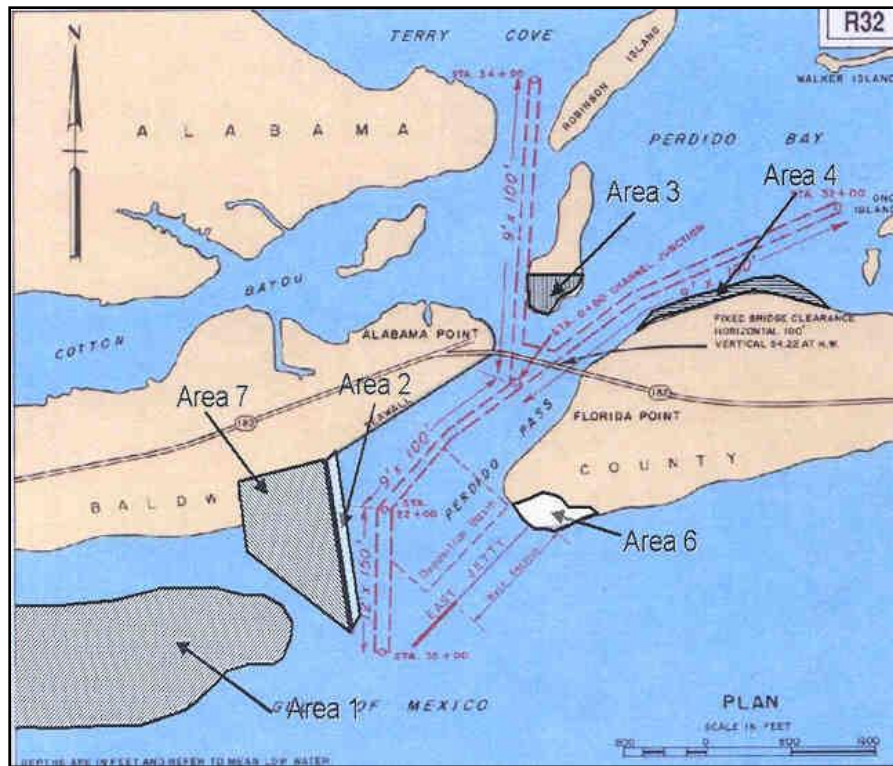
management is a philosophy of project implementation that will be continuously realized within the region. Because the Demonstration Program was conducted for a finite time period, the Mobile District focused efforts on prioritizing those projects and associated issues that could be addressed to quickly realize the benefits resulting in the regional management approach. The experience gained from these initiatives continues to be extended and applied to other projects. The Mobile District identified five primary initiatives as the main focus: (1) Perdido Pass, (2) Pensacola Harbor (Fort McRee), (3) East Pass (Norriego Point), (4) St. Andrews Inlet (Gator Lake), and (5) beneficial use of dredged river sand from the Apalachicola River to nourish Alligator Point. Figure 1 shows the location of each. For each of the initiatives identified, management issues were identified and alternatives considered for improved project management. The intent was to implement a change, develop a monitoring scheme, and evaluate benefits linked to improved project performance. When initiatives are implemented that maximize regional benefits, these changes will then be permanently incorporated into management practice. If significant benefits are not realized as a result of the initiative, then a modified or different alternative will be considered and the process repeated. This approach is critical towards improving the design, maintenance, and overall regional management practices of NGOM projects. The following sections discuss each of the initiatives and the regional sediment management implementation process.



**Figure 1. NGOM RSM demonstration area, and location of project initiatives.**

### **Perdido Pass.**

**Problem.** Since 1971 over 5.2 million cu yd of sediment has been dredged from the navigation channels at Perdido Pass. Traditionally, most of this material has been placed at six disposal sites in and around the Pass as illustrated in Figure 2. The problem lies in that much of the sandy material is permanently removed or slow to return to the littoral system. The longshore transport moves from east to west in this area. Placement of the dredged material further downdrift raises other potential problems such as private property issues and the ability to attain easements and right-of-ways. Not allowing the material to be bypassed downdrift could have potential impacts to beaches further to the west or downdrift.



**Figure 2. Existing approved disposal sites for Perdido Pass.**

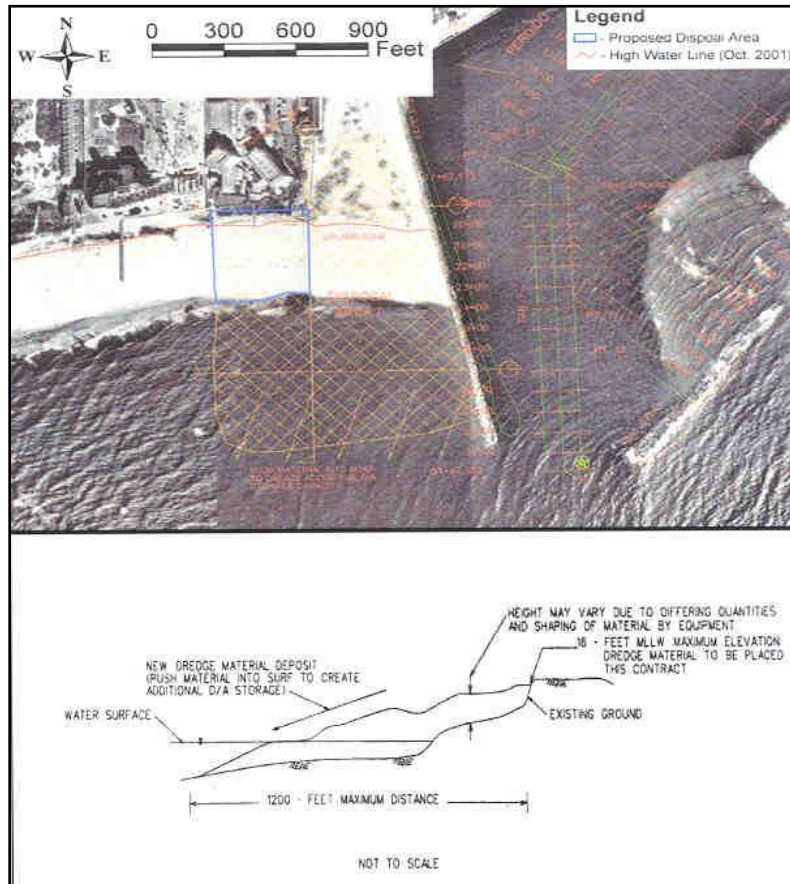
**Initiative.** To improve the sand bypassing mechanism, it was recommended that disposal sites 1, 3, 4, and 7 no longer be used. These sites do not facilitate the return of sediment to the littoral system. A numerical modeling study of Perdido Pass and its beaches recommended that the material be placed downdrift starting at a distance beyond the direct influence of the ebb tidal shoal (Gravens 2003). Placing the sand in this manner maximizes the amount of sand retention in the littoral system and minimizes amounts returning to the navigation channel during periods of longshore transport reversals. For maximum benefits, direct beach placement is recommended. Some material, however, must still be placed adjacent to the jetties at disposal areas 2 and 6 to maintain the structural integrity of the jetties.

**Action.** The purpose of the action is to improve dredged material disposal practices in such a manner as to allow effective return of sand to the downdrift littoral system adjacent to the Pass. The action involved removal of approximately 430,000 cu yd of sand from the navigation channel, of which approximately 400,000 cu yd of dredged material was placed on the downdrift beaches to the west of the Pass. A small volume of sand, approximately 30,000 cu yd, was placed at disposal area 6 (DA-6) to prevent flanking of the east jetty. To test the improved management practice, two bypassing strategies are being monitored. These strategies involved placing the sand downdrift at two separate sites during the regular maintenance dredging operation. Placement for both sites was accomplished by hydraulic pipeline directly on the beach below Mean High Water (MHW). The dredged material is of beach quality and composed predominantly of medium and fine sand. The time of placement was during the fall and winter season of 2002 and 2003. Both sites are being monitored to assess the performance level of each placement strategy.



September 2005

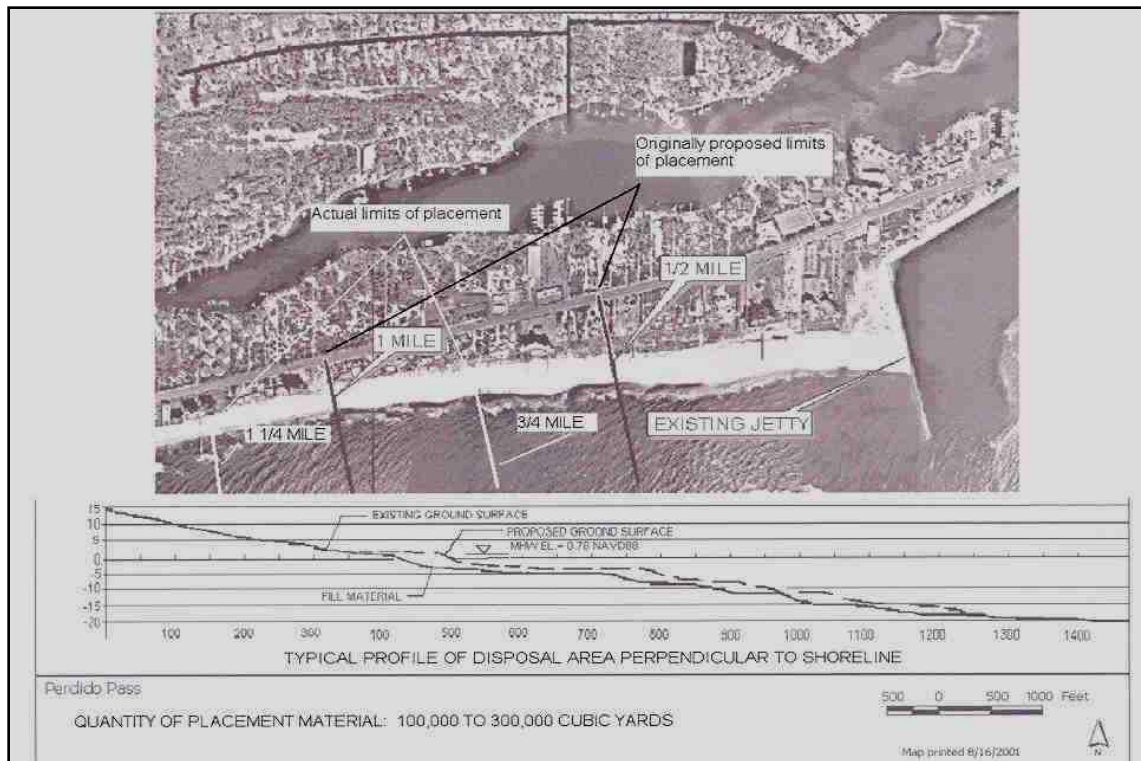
**Eastern RSM demo site.** This action involved a one-time expansion of the existing disposal area 7 (DA-7) westward beyond its original dimension. The expansion consists of the addition of a westward beach extension increasing the length of DA-7 a distance of 400 ft. Of the 400,000 cu yd of sand bypassed to the west, approximately 150,000 cu yd of material was placed in this site. The demo modification was constructed with the typical cross-section shown in Figure 3.



**Figure 3. Eastern RSM demo site adjacent to Perdido Pass, and maximum profile of modified section perpendicular to shoreline.**

**Western RSM demo site.** This action included the addition of a new demonstration disposal area. The purpose of the new demonstration area is to evaluate the success of placing the material westward of the ebb tidal shoal influence. The remainder of the bypassed material, approximately 250,000 cu yd, was placed beginning  $\frac{3}{4}$  miles west of the west jetty extending westward to  $1\frac{1}{4}$  miles west of the jetty. Figure 4 shows the new disposal site and a typical cross-section.

**Nearshore placement site.** This site, referred to as Area 1 in Figure 2, is a 115-acre open water disposal area that extends from a point just west of the west jetty to a point approximately 5,000 ft west of the jetty. Although not the most desirable from a regional sediment management perspective, disposal in this area could result in sand remaining in the littoral system west of the pass. Although not used during this maintenance cycle and demonstration project, it was identified as a backup site to serve in the eventuality that issues were raised to prevent placement of the demonstration sites.



**Figure 4. Location of Western RSM demo site downdrift of Perdido Pass, and typical cross-section as a result of placement.**

**Monitoring.** Monitoring of the Perdido Pass demonstration project is valuable to evaluate the behavior and movement of the material placed in both downdrift disposal areas. The data collected as described below will be used to calculate volume changes in correlation with beach widths and wave information to determine the movement of the bypassed material. By doing so, it is hoped that knowledge will be gained such that better project management decisions can be made for determining the optimum placement of disposal material for maximum return to the littoral system.

**Beach profile surveys.** Beach profile surveys of the shoreline adjacent to the west side of Perdido Pass are being collected at regular intervals. The profiles begin just west of the west jetty and are being collected at 250-ft intervals to a distance of 2 miles west of the jetty. The profiles are being collected from the foot of the dune continuing seaward to the 30-ft contour. Pre- and post-placement profiles were conducted just before dredging and disposal activities, and immediately after completion for both the east and west demonstration areas. Profiles will then be conducted at 3-month intervals thereafter for a period of 1 year.

**Hydrographic surveys of Pass.** Hydrographic surveys of Perdido Pass both inside and outside the Pass are being conducted in concert with the profile surveys. The surveys inside the Pass will include the navigation channel and adjacent areas close to the jetties. The surveys outside the channel will encompass the ebb tidal shoal extending to ½ miles east and west and extending seaward to the 30-ft contour. Pre- and post-surveys have been conducted just before dredging and immediately after completion and will continue at 3-month intervals thereafter for a period of 1 year.

**Aerial photography.** Aerial photography is being flown in concert with the surveys. The use of satellite imagery will also be considered if cost effective. The imagery is being collected at 1 in = 1,000 ft negative scale and rectified to a 1 in. = 400 ft map scale, with a 60% forward overlap. The imagery is orthorectified for positioning and accuracy of measurements. Collection of the imagery has been coordinated as close as possible to the survey activities.

**Wave data.** A directional wave gage is in place and operational at Perdido Pass. To be able to correlate the behavior of the material placed in the disposal areas, it is important to have the wave data corresponding to the changes in the shoreline. The wave gage will remain operational for at least the first year of monitoring. At that point, a decision will be made as to direction of the monitoring program.

**Issues.** Implementing the RSM demonstration project at Perdido Pass did not happen without substantial problems and issues requiring action before, during, and after performance of the project. Some of these issues are described below.

**Private property issues.** The majority of adjacent property owners, primarily the multi-dwelling hotels and condominiums, supported downdrift placement of the dredged material. However, a small number of single-dwelling private property owners objected to the downdrift placement and refused to grant the easements and right-of-ways necessary for placement of material above the MHW line and equipment access. This difficulty with obtaining easements was responsible for causing a 1-year delay of the maintenance activities, and placed undesirable restrictions on where the sand could be placed. Dealing with these issue involved the decision to place the sand at the demonstration sites on state-owned property below the Mean High Water (MHW) line, thus not requiring easements from the property owners. To identify the position of the MHW line and establish the exact boundary between state and private property, the State of Alabama surveyors located a MHW line that was based on an 18-year MHW average elevation of 0.8 ft National Geodetic Vertical Datum (NGVD). Once located, this line was horizontally fixed as the permanent MHW line and established the state/private property boundary.

**Environmental.** As identified through coordination required by the Endangered Species Act, reasonable and prudent measures were agreed to be implemented to minimize adverse affects to the Perdido Key beach mouse, sea turtle nesting habitat, and piping plover critical habitat. These measures included:

- Material placed in DA-6 would not exceed or extend landward beyond the elevation of the existing escarpment created by previous tropical storm activity. A smooth tie-in would be created as not to promote escarpment development.
- If escarpments should develop at the placement areas, the Corps will arrange to deploy appropriate equipment to return the beach to a more natural profile. This shall be accomplished in cooperation with the US Fish and Wildlife Service (USFWS) personnel to aid in the notification of the occurrence of escarpments in these areas. When equipment is deployed to the site, a USFWS representative shall be present to ensure that no existing sea turtle nests will be damaged or destroyed during the operation.

- Monitoring of the project performance will include a cone penetrometer study to evaluate the compaction properties of the placed material. Information from this study will be used towards future project management decisions related to sea turtle nesting issues.

**Placement.** Restricting the placement of the material below the established MHW line and over such narrow reaches, especially at the western site, resulted in undesirable and unsafe beach formations. Such formations included ponds, escarpments, and steep drop-offs. Not only do these features create unsafe conditions for humans, they could provide a detrimental impact to nesting sea turtles. On several occurrences, equipment was deployed to correct these formations and restore the beach to a more natural profile. These types of formations may be prevented if the sand could be placed at higher elevations and over longer reaches of beach.

**Public Perception.** There remains a significant portion of the public that does not understand the values and benefits of managing coastal sand in a manner that promotes shoreline maintenance. Typical complaints from the general public include:

- The beach is too wide and it is too far to get to the water.
- If you build a beach, other people will come and we do not want others using our beach.
- The pipeline and equipment are unsafe, unsightly, and annoying.
- The additional sand is ruining the fishing at our pier.

Continued public outreach programs could do a lot to alleviate many of these concerns and educate people on the benefits of RSM.

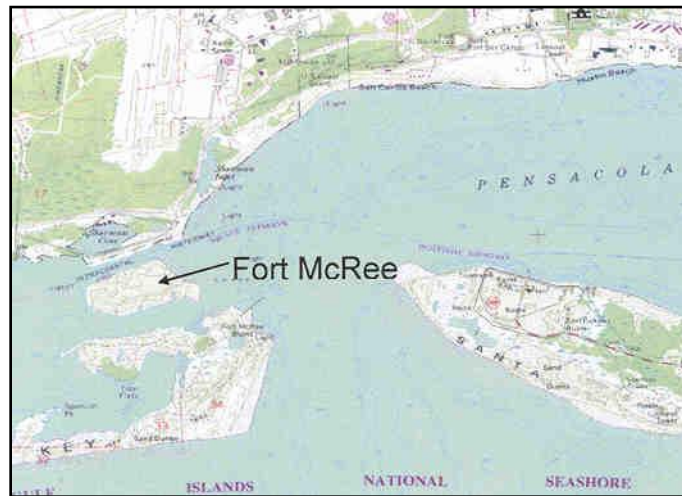
**Benefits.** It is anticipated that more efficient bypassing of sand associated with maintenance activities at Perdido Pass would contribute towards alleviating some of the coastal erosion problems that have been observed downdrift. Modifying the management practices will result in more material being dispersed in the littoral system, resulting in downdrift beach accretion. Such practices will also eliminate problems created by stockpiling and mounding sand immediately west of the west jetty. Benefits from the modified placement procedures are a wider downdrift beach, which creates more nesting habitat for endangered sea turtles. The additional habitat is also beneficial to a variety of shore birds as well as other inhabitants of the coastal environment. Wider beaches augment natural dune creation and maintenance, which will be beneficial for dune dwelling organisms. Established dune systems are also beneficial in providing greater storm protection to adjacent habitats. Educating the public through outreach activities will result in increased cooperation from private property owners.

### **Pensacola Pass (Fort McRee).**

**Problem.** As part of maintaining navigable waterways in the vicinity of Pensacola Pass, the US Army Corps of Engineers (USACE) conducts periodic dredging of the Gulf Intracoastal Waterway (GIWW). Some of the dredged material is stockpiled on Fort McRee which is a 40-acre diked upland site created on an island in the mouth of Big Lagoon near the eastern end of Perdido Key as illustrated in Figure 5. The disposed material is believed to be beach quality sand, however, disposal at this location does not allow the material to disburse into the local littoral system. Such material can be used beneficially on the adjacent beaches of Santa Rosa



Island and Perdido Key. Use of the stockpiled sand for beach replenishment would require investigations as to the ownership of the sand and funding sources available to transport the material where it is needed.



**Figure 5. Location of the Fort McRee GIWW disposal area.**

**Action.** This initiative involves investigating beneficial uses of the beach quality sand being held in the Fort McRee disposal site. The Gulf beaches on both Santa Rosa Island and Perdido Key are experiencing erosion and could benefit from this material. Removing the material from the current disposal site would also increase the capacity for further placement from dredging activities of the GIWW, possibly making more material available for future use. A possibility for obtaining funding toward achieving this initiative is Section 204 of the Water Resources Development Act, which provides authority for the USACE to restore, protect, and create aquatic and wetland habitats in connection with construction or maintenance dredging of an authorized project. The State of Florida has submitted a request to pursue Section 204 as a funding mechanism and has agreed to be the non-Federal sponsor. A Preliminary Restoration Plan (PRP) has been developed and submitted to the State for review. On acceptance by the State, the PRP will be submitted to the USACE South Atlantic Division (SAD) for approval and request for funding. The next step will be a feasibility study to determine the most beneficial and preferred uses of the material.

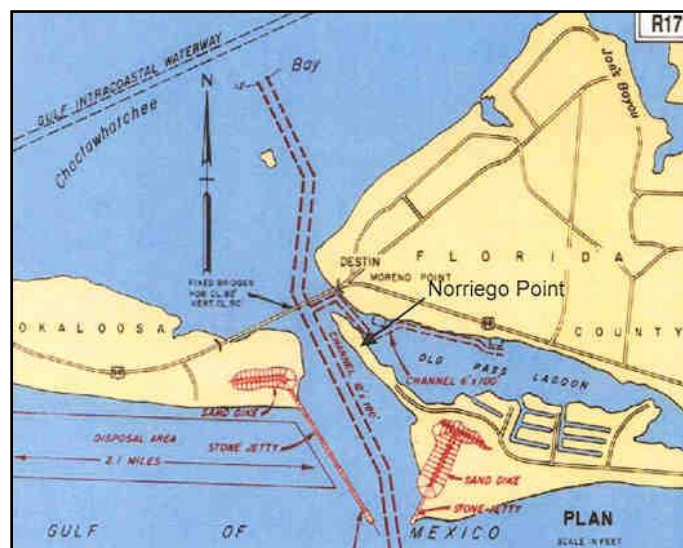
**Issues.** The problems and issues that are expected to be encountered during the Fort McRee feasibility study include identifying areas of greatest need for the dredged material, determining patterns of erosion and/or accretion, determining logistics of transporting sand to the potential receiving sites, and determining legal ownership of the material. Environmental issues encountered will involve threatened and endangered species and their critical habitats and essential fish habitat.

**Benefits.** Beach quality material returned to Gulf beaches will result in a more natural maintenance of adjacent beaches, which will help alleviate some of the local erosion problems providing increased storm protection. Modifying the management practices by using this potential source of beach quality sand will result in more material being dispersed in the littoral system resulting in likely benefits down-drift. Such practices will also eliminate problems created

by stockpiling the disposal site to its maximum capacity. Removing the sand will increase the site's overall capacity.

### East Pass (Norriego Point).

**Problem.** East Pass is located along the Florida panhandle near the City of Destin (Figure 6). The existing East Pass Navigation Project provides for a 12-ft-deep by 180-ft-wide channel from the Gulf of Mexico into Choctawatchee Bay, FL, and a 6-ft-deep by 100-ft-wide channel 3,800 ft long from East Pass Channel into Old Pass Lagoon. The project also consists of two converging jetties spaced 1,000 ft apart at the seaward end. The east jetty is approximately 1,100 ft long with a 450-ft-long spur groin at its northern end. The west jetty is approximately 3,000 ft long and does not have a spur groin.

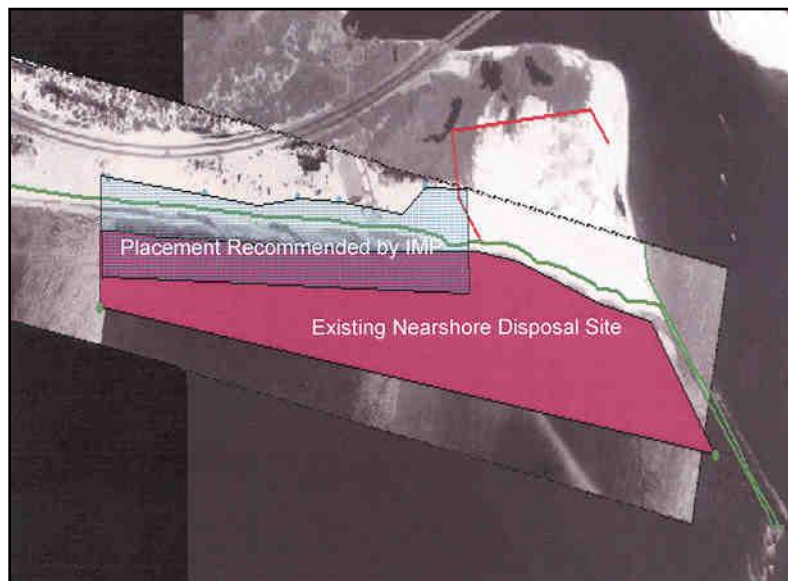


**Figure 6. East Pass project features.**

An Inlet Management Plan (IMP) for East Pass and Choctawatchee Bay was developed by Taylor Engineering, Inc. (1999) under contract to the State of Florida. The IMP recommends maintenance dredging of the Pass on a biennial (every 2 years) basis and bypassing of 164,000 cu yd (82,000 cu yd per year) in a new disposal configuration on the downdrift beaches to the west of the inlet. The USACE is the agency responsible for maintenance activities in East Pass and would also be responsible for implementing this plan with the State and other local sponsors. The intent of the USACE is to accept and implement the recommendations of the IMP within the limits of USACE authority and to the maximum extent practicable without comprising the structural integrity of the project. Implementing the plan requires placing dredged material from the navigation channels either in the nearshore zone or directly on the downdrift beaches. Under recent maintenance practices, much of the material dredged from the navigation channels has been placed on Norriego Point (Figure 6) for erosion mitigation, which did not satisfy the recommended bypassing requirements. An existing downdrift nearshore disposal site (Figure 7) has historically been used for bypassing. This site is situated 200 ft west of the west jetty continuing west approximately 7,000 ft, and extending seaward from the MHW line to the -14-ft contour. Placement within the site is currently restricted between the -14- and -5-ft contours Mean Lower Low Water (MLLW). Making the dredged material available for downdrift placement requires

September 2005

alternative measures for mitigating erosion at Norriego Point. Alternatives are currently being considered for the placement of permanent structures to stabilize Norriego Point thus allowing more sand to be bypassed to the downdrift beaches.



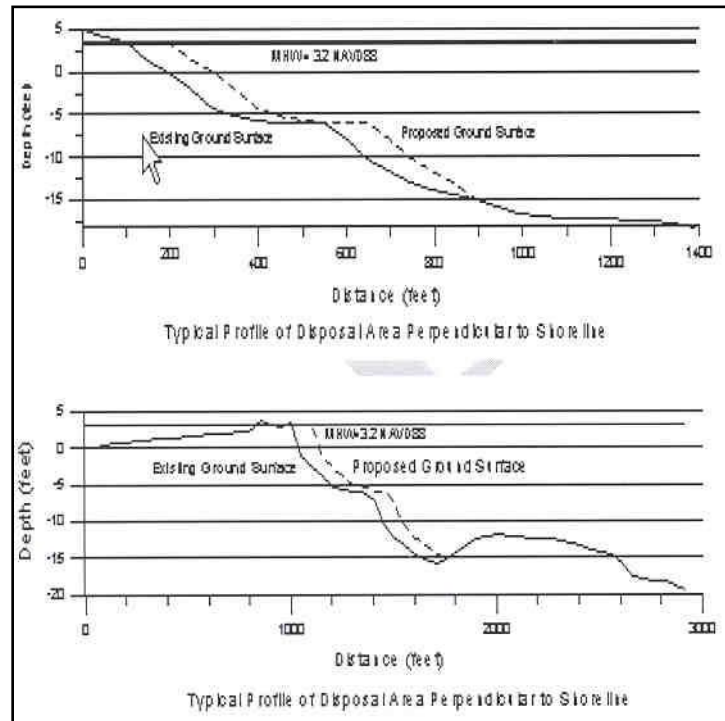
**Figure 7. Location of the existing nearshore disposal site and the disposal area recommended by the IMP. The solid line along the shoreline represents the MHW line.**

Bypassing the sand downdrift involved the use of property belonging to Eglin US Air Force Base (AFB), and required real estate permissions to be obtained from the US Air Force (USAF). Placing the sand in this manner required transporting the material a farther distance using additional pipelines, which increased the cost of the maintenance dredging operations.

**Action.** The action involved modifying the management and placement practices of the existing approved nearshore disposal site to satisfy the IMP (Figure 7). The IMP recommends placement of the material directly on the beach beginning 2,200 ft west of the inlet, which falls within the current nearshore site. Current site restrictions, however, limited placement within the site between the -14-ft and -5-ft contours MLLW. The action modified the limits of placement within the existing site landward to allow direct beach placement up to the MHW line. Because a long-term agreement with the USAF could not be obtained for direct beach placement in time to accommodate the maintenance activity window, a one-time license was granted to allow access of support equipment to the USAF property for downdrift placement of material from the -14-ft contour up to the MHW line.

The latest maintenance cycle was conducted over a 2-year period during the fall/winter seasons of 2001/2002 and 2002/2003, and placed approximately 240,000 cu yd of material dredged from the navigation channel through the inlet and ebb tidal shoal on the downdrift beaches beginning 2,200 ft west of the Pass. Placement was accomplished by hydraulic pipeline directly on the beach at or below the MHW line within the modified disposal area. The desired cross-sections achieved transposed the profiles seaward but did not increase the berm elevation (Figure 8). As mentioned earlier, bypassing the sand further downdrift cost more than the traditional

maintenance disposal. The increased cost for this operation was paid by Okaloosa County, which is the non-Federal sponsor for this project. The county has been involved early in the RSM Demonstration Program, and understands the resulting long-term benefits that can be realized with this type of management approach.



**Figure 8. Typical cross-sections achieved by the modified placement from MHW line to the -14-ft contour.**

**Benefits.** It is anticipated that more efficient bypassing of sand associated with maintenance activities at East Pass contributes towards returning sand to the littoral system thus providing more natural maintenance of adjacent downdrift beaches. Maintaining wider beaches contributes to the overall health of the coastal ecosystem. The improved structural protection proposed for Norriego Point will result in increased shelter to adjacent marinas and businesses along the northwest shore of Old Pass Lagoon. Educating stakeholders through technical working groups, workshops, and other outreach activities resulted in increased cooperation from the USAF and Okaloosa County. This RSM action demonstrated a cooperative effort at all levels of government.

**Issues.** This initiative involved overcoming the issues pertaining to bypassing sand downdrift of East Pass. It is recommended placement of most of the maintenance dredge material up to 2,700 ft west of west jetty either directly on the beach or in the nearshore. Additional measures must be taken to protect Norriego point to make the sand available. For all of this to be accomplished requires cooperation and partnerships between the Corps, Florida Department of Environmental Protection (FLDEP), Okaloosa County, the City of Destin, and the USAF at Eglin. Bypassing operations will increase the cost of maintenance dredging operations.

During the process of obtaining the required environmental clearances, the USFWS indicated that they have reason to believe that Gulf sturgeon may be present in and around East Pass



September 2005

during the time period of the dredging operations, and that adverse impacts could occur without implementing prudent measures. East Pass is considered a pathway for the migration of the sturgeon between the Gulf of Mexico and Choctawatchee Bay, and possibly provides foraging habitat. Conducting dredging operations during the proposed timeframe could: (1) hinder passage of the sturgeon, (2) affect food resources or feeding behavior, or (3) directly harm fish by entrainment in dredging equipment. The USFWS recommended a monitoring program to gain information pertaining to migration behavior of the sturgeon between the Gulf of Mexico and Choctawatchee Bay during the dredging operations. The Corps agreed to implement such a program, which included monitoring the migration of the sturgeon in the presence of the proposed dredging activities. Results of the monitoring indicated that sturgeons are not present during the winter timeframe in which typical maintenance operations occur. The information gained from this study will be used to provide valuable information for more effective planning of future dredging operations along the northern Gulf of Mexico.

### St. Andrews Inlet (Gator Lake).

**Problem.** USACE conducts periodic maintenance dredging of the St. Andrews Inlet navigation project (Figure 9). Traditionally, most of the beach suitable dredged material (~ 84,000 cu yd/yr) is bypassed to the western downdrift beaches. However, some of the material (~ 39,000 cu yd/yr) is placed along the western interior shoreline of the inlet fronting Gator Lake, a freshwater lake within St. Andrews State Park. The material is placed at this area to prevent the inlet from breaching into the environmentally sensitive freshwater habitat. Material placed along the Gator Lake shoreline does not return to the littoral system with much of it going back into the navigation channel and must be re-handled. An alternative structural method for protecting Gator Lake would allow more beach quality material to be available for bypassing to the downdrift beaches.



**Figure 9. St. Andrews Inlet showing the adjacent environmentally sensitive Gator Lake.**

**Initiatives.** A Section 1135 under the Continuing Authorities Program (CAP), Project Modifications for Improvements to the Environment, Water Resources Development Act of 1986 (PL 99-662), as amended, is being pursued, and provides authority for the Corps of Engineers to



restore degraded ecosystems if construction or operation of the project has contributed to the degradation of the quality of the environment. The project proposes modifying the existing west jetty and construction of detached breakwaters to provide permanent protection to the shoreline fronting the lake. This would allow more sand available for bypassing downdrift.

**Benefits.** Increasing sand bypassing will aid in reducing shoreline erosion resulting from accretion of the beach west of inlet. Wider beaches provide greater storm protection. Wider beaches will also result in greater recreational use, which benefits both national and regional economies. Other benefits include improving habitats for shoreline wildlife. Implementing the alternative protection for Gator Lake will reduce the threat of saltwater breaching into the sensitive freshwater habitat. Placing less sand at the Gator Lake site will reduce the amount of material that must be re-handled during subsequent maintenance operations.

**Issues.** The problems and issues that are expected to be encountered during the Gator Lake feasibility study include identifying the area of optimum downdrift placement to ensure that the sand remains in the littoral system and does not return to the navigation channel. Environmental issues encountered will be pertaining to threatened and endangered species and their critical habitats and essential fish habitat. Of particular interest will be nesting sea turtles and Gulf sturgeon.

### **Beneficial Use of Dredged River Sand.**

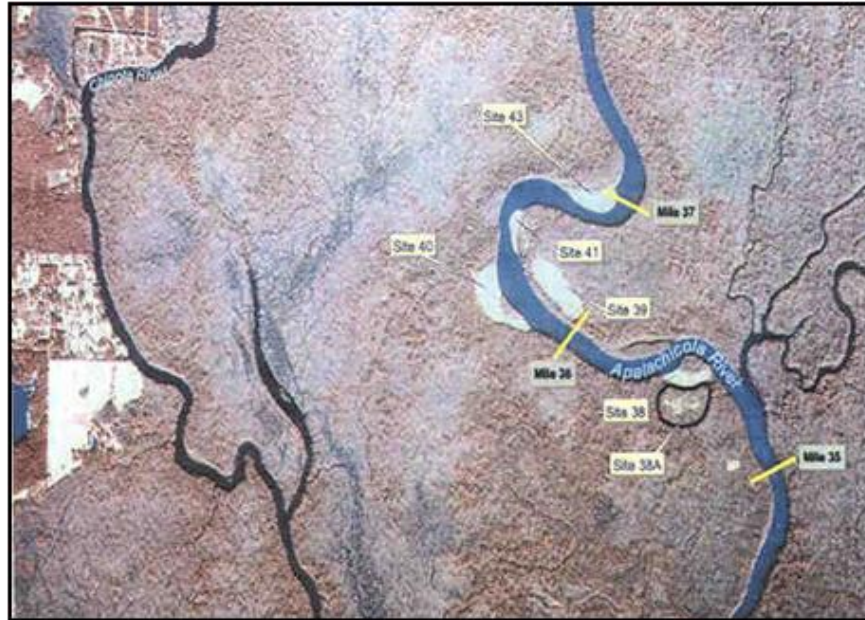
**Problem.** Mobile District is responsible for maintaining the navigation channels of the Apalachicola River in Florida. Maintenance procedures require that material dredged from these channels should be placed in upland disposal areas (DA) at selected sites throughout the river system. However, many of the DAs are approaching the limits of their storage capacity requiring either the acquisition of new DAs or removal of some of the material to allow continuous maintenance activities. Other DAs were permitted with the requirement that restoration and removal of material be conducted after a certain period of time. This situation is all too apparent in the river's Corley Slough reach, which contains a number of such DAs (Figure 10). Materials contained in the Apalachicola River DAs represent a potential source of beach quality sand, which may have beneficial uses along the Florida panhandle coastal areas. Use of the disposal material in this manner can increase the capacity and life of the DAs and eliminate the astronomical costs of acquiring new sites. Sand can also become available as a result of performing ecological restoration activities at selected DAs.

Coastal resources along the stretch of shore at Alligator Point in Franklin County, FL, have consistently been diminished due to high shoreline recession rates exhibited in the immediate area and subsequent coastal armoring to protect the adjacent roadway causing the loss of valuable beach habitat and recreational functions. The result has been a total loss of the beach as seen in Figure 11, including loss of associated habitats, recreational function, and ongoing failure of the evacuation road. Alligator Point provides an excellent opportunity for beneficial use of materials from the Apalachicola River while providing valuable benefits at both riverine disposal areas and coastal sites.

**Initiative.** The proposed action consists of removing and using material from DAs along the Corley reach of the Apalachicola to restore a beach and dune system at Alligator Point in Franklin County, FL. The beach and dune will be constructed along the existing rock revetment

**September 2005**

designed to protect a hurricane evacuation route (County Road 370) servicing the local community. Sand will be removed from the DAs and placed at Alligator point on an annual basis depending on river conditions. River conditions must be conducive to access the DA's and transport the material via barge to the coast.

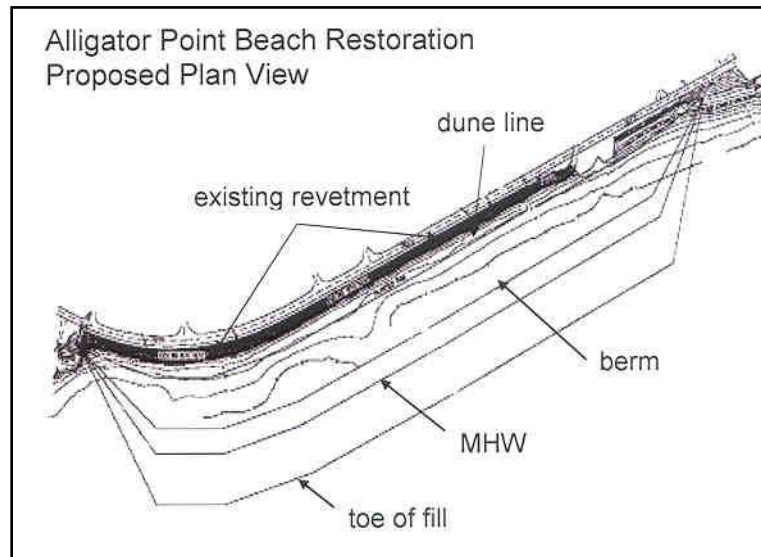


**Figure 10. Location of DAs within the Corley Slough reach of the Apalachicola River.**

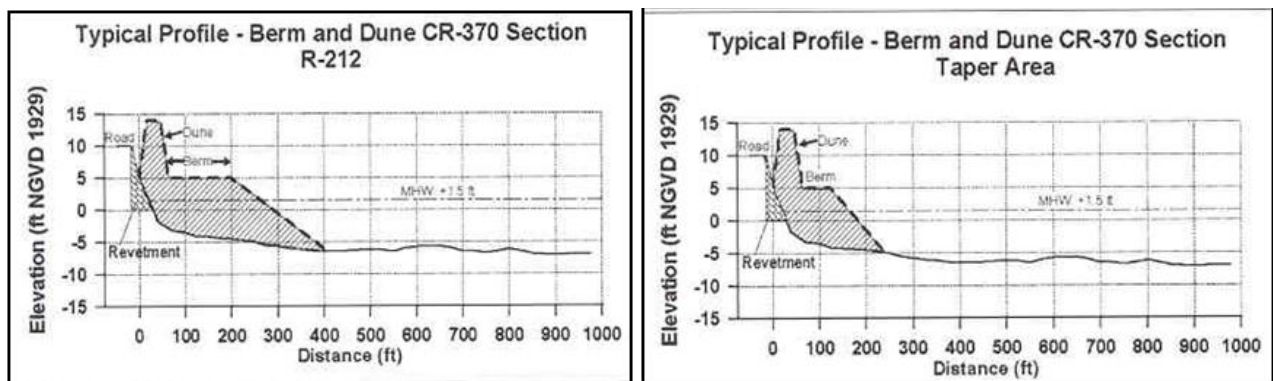


**Figure 11. Portion of Alligator Point project site demonstrating lack of beach, and proximity to the evacuation road.**

Initial placement of material will be transported from DA 40 as an Operations and Maintenance (O&M) action to provide additional capacity at the site. The proposed plan view and desired beach-dune profiles for the interior and ends of the project are illustrated in Figures 12 and 13, respectively. The dimensions are assuming an initial placement of 250,000 cu yd of sand. It is anticipated that some type of containment structure(s) will be required in the future to sustain long-term benefits provided by the beach restoration.



**Figure 12. Desired plan view of Alligator Point, assuming initial placement of 250,000 cu yd.**



**Figure 13. Desired profiles assuming initial placement of 250,000 cu yd of sand.**

**Benefits.** Removing material from DA 40 provides additional capacity and avoids the costs of acquiring additional DAs. A beach is nonexistent along the rock revetment at Alligator Point. Constructing a beach and associated dune system will be conducive to restoring sea turtle nesting habitat that was once present in this area. Beaches and dunes provide foraging and roosting habitats for various shorebirds including some threatened and endangered species. Alligator Point is within the regional flyway of migratory birds. The restored shoreline will provide additional resting and wintering areas for these birds. The creation of a dune would allow the establishment of multiple vegetation types associated with local dune habitats. The proposed project would also provide general benefits by creating opportunities for the production of food

sources thus contributing to the general well being of waterfowl, raptors, nearshore fish, and other wildlife associated with the coastal environment. A beach-dune system will be advantageous for increased overall stability of the entire beach ecosystem by providing reserves of sand acting as a buffer to resist erosive events. The increased beach stability will directly contribute to the sustainability of the restored habitats and restore recreation activities.

**Issues.** The method of transporting and placing the sand at Alligator Point is costly and illustrates the limitations of the equipment and technology. The method of placement for this action will involve loading the material from the DA onto river barges and transporting the loaded barges to an approved docking facility in Carrabelle, which is approximately 35 miles from placement site. The sand will be offloaded onto dump trucks using a clamshell crane and transported to Alligator Point and deposited on the beach site. Bulldozers will be used to distribute and shape the material to the desired configuration. Other methods considered were transferring the material from the river barge to an ocean scow and either pumping the sand directly from the scow onto the beach or temporarily depositing the sand at a nearshore site. The material would then have to be re-dredging and pumped it to the beach. These other methods were quite costly and provided numerous environmental issues that would have to be overcome. No matter what method is used, the sand would have to be handled as least twice.

Due to the nature of the placement methods, the cost of the beach reconstruction is high, thus creating inherent funding issues. Removing sand from the Apalachicola DAs outside of the O&M authority requires the need for other existing authorities with the capacity to support these activities. It is likely that non-Federal cosponsors will be necessary with the interest and monetary resources to share in the funding requirements.

**DISCUSSION.** This Coastal and Hydraulics Engineering Technical Note describes several initiatives undertaken by the Mobile District as part of the NGOM Regional Sediment Management Demonstration Program, and presents some of the benefits as well as challenges associated with implementing this approach as a business practice within the District. It is the Mobile District's intention to implement the regional sediment management approach as a part of all projects. Doing so requires a corporate commitment within the District and establishing partnerships with associated stakeholders at all levels of government. Implementing regional sediment management requires the proper balance of engineering, technology, information, and tools to feed the management decisions necessary in achieving the RSM approach. Without this balance and levels of commitment, the benefits of RSM cannot be fully realized.

Some "lessons learned" that were gained through beginning the regional sediment management approach with these five initiatives include:

- Educating the public may be critical to completing the project. Information directed to the layperson that describes what regional sediment transport patterns are in the vicinity of the project, and what the USACE is trying to accomplish with the management action are essential (Perdido Pass).
- If a long-term agreement between partners and/or property owners for the new regional sediment management approach is not feasible in the allotted time, consider a one-time "pilot project" agreement (East Pass).

- Document all physical, environmental, and biological monitoring and share results with partners, other agencies, and the public. Knowledge gained at one project (e.g., migratory behavior of endangered sturgeon is not an issue during dredging operations in the winter timeframe) may apply to other projects in the future (East Pass).
- Benefits from a regional management approach may not be immediately realized. It may be necessary to compare the costs of the project to the long-term benefits as they are realized over larger spatial scales (Apalachicola and Alligator Point).

**ADDITIONAL INFORMATION.** This Coastal and Hydraulics Engineering Technical Note (CHETN) was written by Larry E. Parson and Dr. Susan I. Rees, US Army Corps of Engineers Mobile District, Mobile, AL. The work described herein was supported by the National Regional Sediment Management Demonstration Program. Additional information regarding the RSM can be found at the RSM web site <http://rsm.usace.army.mil>

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<http://chl.erd.usace.army.mil/library/publications/chetn/pdf/chetn-xiv-17.pdf>

## **REFERENCES.**

- Gravens, M. B. 2003. Sediment management at Perdido Pass, Alabama. *Proceedings, Coastal Sediments 2003*. Clearwater Beach, FL: American Society of Civil Engineers.
- Lillycrop, L. S. and J. M. Wozencraft. 2003. Engineering tools for regional sediment management. *Proceedings, Coastal Sediments 2003*. Clearwater Beach, FL: American Society of Civil Engineers.
- Taylor Engineering, Inc. 1999. Inlet management plan for East Pass to Choctawatchee Bay. (prepared for Florida Department of Environmental Protection, Tallahassee, FL.)



**ACRONYMS AND ABBREVIATIONS.**

<b>Term</b>	<b>Definition</b>
CAP	Continuing Authorities Program
CHETN	Coastal and Hydraulics Engineering Technical Note
CHL	Coastal and Hydraulics Laboratory
DA	Disposal Area
DC	District of Columbia
DP	Demonstration Program
ERDC	Engineer Research and Development Center
FLDEP	Florida Department of Environmental Protection
GIWW	Gulf Intracoastal Waterway
HQUSACE	Headquarters, US Army Corps of Engineers
IMP	Inlet Management Plan
IWR	Institute for Water Resources
MHW	Mean High Water
MLLW	Mean Lower Low Water
NGOM	Northern Gulf of Mexico
NGVD	National Geodetic Vertical Datum
O&M	Operations and Maintenance
PL	Public Law
PRP	Preliminary Restoration Plan
RSM	Regional Sediment Management
SAD	[USACE] South Atlantic Division (SAD)
USACE	US Army Corps of Engineers
USAF	US Air Force
USFWS	US Fish and Wildlife Service

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